Middle Grades Education
Endorsement Guidelines
To Accompany Rule 24
(Adopted by the State Board of Education on 11/16/00)

006.40 Middle Grades Education

006.40A Grade Levels: 4–9

006.40B Endorsement Type: Field

006.40C Persons with this endorsement may teach either: (a) any or all subjects in a self-contained classroom in grades 4 through 9, (classrooms in which students spend more than half the school day with one teacher who provides instruction in more than half of the subject-matter areas of the curriculum) or (b) the content areas of specialization in any organizational pattern in grades 4 through 9.

006.40D Certification Endorsement Requirements: This endorsement shall require a total of 66 semester hours of which 30 semester hours shall be in professional education courses related to middle level education and a minimum of 36 semester hours in two or more Content Areas of Specialization with a minimum of 18 semester hours in each area. An endorsement in any of the Special Education endorsements, which includes any portion of grades 4-9, may be accepted in lieu of one Content Area of Specialization. In addition, persons with this endorsement must complete coursework in all academic areas of the middle grades curriculum.

006.40D1 Content Areas of Specialization include the following:

006.40D1a Agricultural Education
006.40D1b Art
006.40D1c Business Education
006.40D1d Family and Consumer Sciences
006.40D1e Foreign/World Language
006.40D1f Health and Physical Education
006.40D1g Industrial Technology
006.40D1h Language Arts
006.40D1i Mathematics
006.40D1j Natural Sciences
006.40D1k Social Science

006.40D2 Coursework in all academic areas of the middle grades curriculum includes:

006.40D2a communication, including composition and speech,
006.40D2b health and wellness,
006.40D2c humanities, including literature,
006.40D2d mathematics,
006.40D2e natural sciences,
006.40D2f social sciences, and
006.40D2g fine arts.

006.40D3 Clinical experiences. Prospective teachers shall be engaged in clinical experiences which shall include:

006.40D3a involvement with students at grades 4, 5, or 6 and students at grades 7, 8, or 9,
006.40D3b involvement with students representing special populations, and
006.40D3c teaching experiences in each of the prospective teacher's content areas of specialization.

006.40E Endorsement Program Requirements: Nebraska teacher education institutions offering this endorsement program must have on file, within the institution, a plan which identifies the courses and the course completion requirements which the institution utilizes to grant credit toward completion of this endorsement.

THE FOLLOWING ARE RECOMMENDED GUIDELINES FOR INCLUSION AS PART OF THE INSTITUTION'S PLAN UNDER THIS ENDORSEMENT.

The institution should prepare prospective teachers to:

A. Demonstrate knowledge and an understanding of the concepts, skills, and processes of the Nebraska Content Standards for grades four and eight, and the concepts, skills, and processes beyond the eighth grade leading to the twelfth grade standards in the areas of reading/writing, mathematics, science, and social studies. Those prospective teachers, who select one or more of the above areas as their Content Area(s) of Specialization, should demonstrate in their content area of specialization both an understanding of and the ability to teach the concepts, skills, and processes of the Nebraska Content Standards for grades four and eight, and those beyond the eighth grade leading to the twelfth grade standards.

B. Demonstrate academic background knowledge in the following areas and be able to utilize the knowledge, skills, and processes of:
   1. communication, including composition and speech;
   2. health and wellness;
   3. humanities, including literature;
   4. mathematics;
   5. natural sciences;
   6. social sciences; and
   7. fine arts.

C. In a minimum of 30 semester credit hours of professional education coursework the program should prepare prospective teachers to:
   1. demonstrate an understanding of and be able to apply knowledge of the growth and development of young adolescents with a range of abilities and disabilities including:
      a. the physical, intellectual, emotional, and social development of young adolescents, within social and cultural contexts;
      b. typical and atypical patterns in growth and development; and
      c. changes in family settings, social contexts, threats to health and safety, and risk behaviors in contemporary society that affect healthy development of young adolescents.
   2. demonstrate developmentally appropriate methodological skills and strategies for teaching the middle level core subject areas, including reading and language arts, mathematics, science, social sciences, and the fine arts.
   3. demonstrate developmentally appropriate methodological skills and strategies for integrating two or more of the following content areas:
      a. Agricultural Education
      b. Art
      c. Business Education
      d. Family and Consumer Sciences
      e. Foreign Language
      f. Health and Physical Education
      g. Industrial Technology
      h. Language Arts
      i. Mathematics

j. Natural Sciences

k. Social Science

4. utilize teaching skills and strategies appropriate for young adolescents in each of the prospective teacher's content areas of specialization, including being able to:

   a. create and evaluate learning environments and activities which are developmentally appropriate and culturally responsive;

   b. utilize multiple assessment strategies for the purposes of planning instruction and facilitating student learning, including being able to utilize prescriptive skills in planning and modifying individual and group instruction;

   c. develop rigorous and developmentally appropriate curriculum for young adolescents;

   d. teach the basic concepts and skills of inquiry;

   e. plan, implement, and assess integrated curriculum;

   f. teach reading and writing relevant to the prospective teacher's content areas of specialization;

   g. structure instruction so that all students are both challenged and successful, including being able to:

      (1) demonstrate skills in differentiating curriculum and instruction, and

      (2) modify the environment to meet the special needs of young adolescents with a range of abilities and disabilities;

   h. utilize strategies which facilitate students attaining mastery of content;

   i. incorporate learners' ideas, interests, and questions into the exploration of curriculum and pursuit of knowledge; and

   j. utilize multiple grouping strategies that emphasize interdependence, cooperation, and individual responsibilities.

5. demonstrate positive relationships with young adolescents, including being able to:

   a. facilitate students in their own problem solving;

   b. recognize and respond appropriately to the diversity among young adolescents; and

   c. manage student behavior while concurrently promoting self-discipline and positive self-image.

6. demonstrate cooperative and collaborative skills in working with others, including being able to:

   a. collaborate and team teach with one or more teachers; and

b. collaborate with families, resource persons, and community groups to achieve common goals for young adolescents.

7. demonstrate an understanding of and ability to apply current research and best practices, and
8. demonstrate understanding of the philosophy and history of middle level education.

D. Demonstrate competence in two (2) or more Content Areas of Specialization with a minimum of 18 semester hours in each for a total of 36 semester hours. An endorsement in any of the Special Education endorsements, which includes any portion of grades 4 through 9, may be accepted in lieu of one Content Area of Specialization. The Content Areas of Specialization should be selected from the following list of content areas and candidates must be able to demonstrate the competencies in the selected areas:

1. **Agricultural Education**. The program should prepare prospective teachers to:
   a. utilize advanced technology to gather information and data, calculate, and write reports;
   b. access information and resources from multiple sources;
   c. create curriculum which meets diverse student needs;
   d. manage laboratories and field experiences;
   e. provide information regarding career opportunities in agriculture;
   f. research, evaluate, and apply new technologies in the agricultural industry;
   g. provide leadership to and serve as advisor for FFA and Young Farmers;
   h. analyze the impact of the agriculture industry on the economy of a community, state, nation, and at an international level;
   i. analyze the critical elements of human relations and communications related to sales and service, including solving customer problems, customer follow-up, and using ethical business procedures;
   j. describe the various crops, including those grown in Nebraska, and the characteristics of each;
   k. evaluate cropping decisions, analyze cultural conditions, and solve problems affecting plant growth based on environmental as well as economic considerations;
   l. describe the production, marketing, and economic impact of the horticulture industry;
   m. analyze the interrelationships between the agricultural industry and natural resources;

n. describe major features and resources of the ecosystem and their importance to the agriculture industry;

o. analyze global issues related to the finiteness of resources, consumption patterns, and need for clean air, clean water, and solid waste management;

p. describe various species of livestock, including those raised in Nebraska, and the characteristics of each;

q. evaluate livestock management decisions, including profitability and environmental effects including: (1) the fundamentals and interrelationships between nutrition, animal health, reproduction, and genetics on livestock, companion, and non-traditional animals; and (2) the effects of nutrition, animal health, reproduction, and genetics on marketing;

r. solve problems in agricultural mechanics, including being able to utilize an operator's manual;

s. demonstrate competence in the basic use of mechanical tools, equipment, facilities, and accessories;

t. describe the interrelationship between the food industry and social and cultural practices, including market demand; and

u. analyze leadership skills and performance situations.

2. **Art**. The program should prepare prospective teachers to:

a. describe the foundations and philosophies of art education;

b. plan, organize, deliver, and assess a comprehensive art education program to meet the needs of all students;

c. demonstrate knowledge and understanding of art appreciation in a variety of contemporary and past cultures;

d. describe, analyze, interpret, and evaluate works of art;

e. demonstrate knowledge and understanding of aesthetics, the philosophical aspects of art, and the contributions of art to the individual, to community, and to society-at-large;

f. demonstrate an understanding of and be able to apply a variety of ideas, media, techniques, evolving technologies, and processes in both two and three dimensional art;

g. demonstrate an understanding of safety standards; and

h. establish safe instructional practices in the classroom.

3. **Business Education**. The program should prepare prospective teachers to:

a. demonstrate knowledge and understanding of the concepts, principles and processes of:

(1) accounting,

(2) economics or personal finance,

(3) management,

(4) oral, written, and technological communication, and

(5) information technologies and systems;

b. demonstrate knowledge and understanding of the principles and functions of the United States economic system;

c. demonstrate knowledge and understanding of the relationship of the United States economy to the global economy;

d. create learning experiences that facilitate students' acquisition of the role of the consumer in the United States economy;

e. create learning experiences that facilitate students' abilities to make consumer decisions and solve consumer problems;

f. create learning experiences that facilitate students' acquisition of the principles of entrepreneurship, and the process of starting and maintaining a business;

g. create learning experiences that facilitate students' abilities to utilize advanced technologies;

h. provide information regarding career opportunities in the field of business;

i. utilize advanced technology to gather information, manage data, and communicate with a variety of audiences; and

j. utilize vocational student organizations, e.g., Future Business Leaders of America, to develop leadership abilities.

4. **Family and Consumer Sciences.** The program should prepare prospective teachers to:

a. demonstrate knowledge and an understanding of the relationship between family strengths and impact on individuals;

b. analyze the nature, functions, and significance of human relationships in the family and society;

c. develop, select, and use personal, social and material resources to meet human needs;

d. analyze physical, psychosocial, economic, cultural, and aesthetic well-being of individuals;

e. demonstrate an understanding of the role of individuals and families as consumers of goods and services;

f. use current and emerging technologies;

g. incorporate into instruction career exploration that examines the reciprocal nature of career choices and family life; and

h. provide information regarding career opportunities in the field of family and consumer science.

5. **Foreign Language**. The program should prepare prospective teachers to:

a. demonstrate intermediate-high level of proficiency in the target language by being able to:

(1) handle successfully most uncomplicated communicative tasks and social situations. The applicant can initiate, sustain, and close a general conversation with a number of strategies appropriate to a range of circumstances and topics, but errors are evident. The limited vocabulary still necessitates hesitation and may bring about slightly unexpected circumlocution. There is emerging evidence of connected discourse, particularly for simple narration and/or description. The speaker can generally be understood even by interlocutors not accustomed to dealing with speakers at this level, but repetition may still be required;

(2) sustain understanding over stretches of connected discourse on a number of topics pertaining to different times and places; however, understanding is inconsistent due to failure to grasp main ideas and/or details;

(3) read consistently with full understanding simple connected texts dealing with basic personal and social needs about which the reader has personal interest and/or knowledge. Can get some main ideas and information from texts at the next higher level featuring description and narration. Structural complexity may interfere with comprehension; for example, basic grammatical relations may be misinterpreted and temporal references may rely primarily on lexical items. The applicant has some difficulty with the cohesive factors in discourse, such as matching pronouns with referents. The applicant may have to read material several times for understanding; and

(4) meet most practical writing needs and limited social demands. The applicant can take notes in some detail on familiar topics and respond in writing to personal questions. He/she can write simple letters, brief synopses and paraphrases, summaries of biographical data, work and school experience. In those languages relying primarily on content words and time expression to express time, tense, or aspect, the applicant displays some precision; where tense and/or aspect is expressed through verbal inflections, forms are produced rather consistently, but not always accurately. He/she has an emerging

ability to describe and narrate in paragraphs. He/she rarely uses basic cohesive elements, such as pronominal substitutions or synonyms in written discourse. The writing, though faulty, is generally comprehensible to natives used to the writing of nonnatives.

b. The program should prepare applicants to demonstrate the relationships between culture and language, including the ability to:

(1) demonstrate an understanding of the relationship between the perspectives and practices of the target culture and use this knowledge to interact effectively in cultural contexts;

(2) demonstrate an understanding of the relationship between the perspectives and products/contributions of the target culture; and

(3) utilize authentic materials for foreign language instruction, including instruction regarding the target culture.

c. The program should prepare applicants to engage in appropriate pedagogical practices, including the ability to:

(1) demonstrate an understanding of the relationships among central concepts of learning and teaching foreign languages, including the ability to communicate high expectations and create meaningful learning experiences for all students, including:

(a) use effective communication techniques to foster active inquiry, collaboration, and supportive interaction in the foreign language classroom;

(2) demonstrate an understanding of how students differ in their approaches to foreign language learning and are able to adapt instructional strategies to encourage all students' cognitive development;

(3) analyze the impact of diverse learning styles and thinking processes in order to produce meaningful language experiences for all students;

(4) create learning environments that encourage positive social interaction, motivation, and active engagement in learning foreign languages;

(5) plan, implement, and assess foreign language curriculum goals and content which reflect school district guidelines, student needs, and the communities they represent;

(6) be reflective foreign language teachers who continually evaluate the impact of instructional decisions on others (students, parents, and professionals in the learning community);

(7) integrate foreign language and other content areas; and

(8) describe how different languages use different patterns to communicate and apply this knowledge to their own language.

d. The program should prepare applicants to work with families, other professionals, and diverse communities, including the ability to:

(1) foster relationships and collaborative skills with families, colleagues, and community agencies to support foreign language acquisition;

(2) seek appropriate multicultural connections and integrate those perspectives into the foreign language curriculum to prepare students for participation in a diverse world; and

(3) become actively involved in leadership opportunities that promote professional growth in the foreign language area;

e. The program should prepare applicants to demonstrate how facility in foreign language promotes career opportunities and interpersonal skills; and

f. The program should prepare applicants to demonstrate knowledge of a variety of books written for early adolescents in the target language.

6. **Health and Physical Education.** The program should prepare prospective teachers to:

a. select, plan, teach and evaluate developmentally appropriate health and physical education curriculum;

b. apply knowledge of anatomy, physiology, and related sciences to personal and community health care, and physical education activities;

c. describe the aims and objectives of a comprehensive school health education program, and specifically the components of health instruction and physical education;

d. demonstrate an understanding of the sociological aspect related to health and physical activity, including:

(1) the interrelatedness of culture, language, ethnicity, and/or gender on health care issues and the selection of and involvement in physical activities;

(2) the variations in social dynamics among individuals in small group and large group activities; and

(3) the role of physical activities in social, ethical and moral development;

e. analyze the interrelationships of personal and community behaviors and health;

f. demonstrate an understanding of methods to reduce the occurrence of the health risk behaviors which most negatively affect children and adolescents (e.g., physical inactivity, intentional and unintentional injuries, dietary habits,

tobacco use, alcohol and other drug use, and sexual activity which results in sexually transmitted diseases, including HIV/AIDS, and unintended pregnancy);

g. analyze situations to prevent injuries and the spread of contagious diseases;

h. describe the effects of prescription and non-prescription drugs on general well- being and the community;

i. describe the factors involved in emotional and mental health, ways for promoting acceptable emotional reactions, ways for promoting mental health (including exercise), and community responses and responsibilities;

j. demonstrate an understanding of and skills in basic locomotor, non-locomotor, and manipulative movement skills and patterns, e.g., walking, throwing, twisting;

k. demonstrate an understanding of and skills in traditional individual, dual, and team sports and games;

l. demonstrate an understanding of and skills in contemporary, noncompetitive activities suitable for participation throughout life, e.g., hiking, skating, cycling;

m. demonstrate an understanding of and skills in basic rhythmic activities as well as various dance forms;

n. demonstrate an understanding of and skills in exercise and fitness as an activity or series of activities, and the physiological effects of exercise;

o. demonstrate an understanding of human movement from a motor development and motor learning perspective;

p. demonstrate an understanding of typical and atypical social, cognitive, and psychomotor development of children and adolescents;

q. demonstrate an understanding of the philosophical and historical development of health and physical education;

r. create and utilize formative and summative fitness, motor skills, and cognitive assessment skills;

s. design adapted physical education learning experiences for students with special needs; and

t. participate in reflective practices and collaboration with colleagues in order to foster professional growth and to advocate for the health and physical education program.

7. **Industrial Technology.** The program should prepare prospective teachers to:

a. demonstrate industrial technology education laboratory management techniques that incorporate current federal, state, and local environmental, safety and health guidelines;

b. plan, organize, deliver and assess a comprehensive industrial technology education program to meet the needs of all students;

c. establish and employ safety standards and procedures in the instructional environment of the industrial technology laboratory and classroom;

d. research, evaluate and apply current and emerging technologies in industrial technology;

e. utilize advanced technology to gather information, data to formulate and write curriculum specific reports;

f. create curriculum which meets diverse student population needs;

g. demonstrate psychomotor skills and competence in the safe and proper use of tools and equipment currently used in the construction, manufacturing, communications and transportation industries;

h. access information and resources from multiple sources;

i. analyze the nature, function and significance of industrial systems to society;

j. describe the foundations and philosophies of industrial education and their relationships to career and technical education;

k. incorporate career exploration and exposure to career opportunities in industrial technology;

l. integrate Nebraska Content Standards for reading and writing, mathematics, science, and social sciences into the industrial technology education curriculum;

m. demonstrate an understanding and ability to use current technologies associated with industrial technology; and

n. demonstrate an understanding of the characteristics and fabrication processes of materials utilized by the construction, manufacturing, communications and transportation industries.

8. **Language Arts**. The program should prepare prospective teachers to:

a. demonstrate knowledge and an understanding of the English language, including being able to:

(1) demonstrate an understanding of language acquisition and development;

(2) demonstrate how reading, writing, listening, viewing, and thinking are interrelated;

(3) recognize the impact of cultural, economic, political, and social environments upon language;

(4) demonstrate an understanding of diversity in language use, patterns, and dialects across cultures, ethnic groups, geographic regions, and social roles;

(5) demonstrate an understanding of how and why the English language evolves;

(6) demonstrate an understanding of English grammars;

(7) demonstrate an understanding of syntax and phonology; and

(8) demonstrate an understanding of the various purposes for which language is used.

b. demonstrate knowledge and an understanding of reading processes, including being able to:

(1) describe reading and writing development;

(2) teach basic skills and strategies in reading and writing;

(3) teach students to use reading and writing as tools for learning;

(4) motivate readers and writers using a wide variety of methods and materials;

(5) match reading materials with students' abilities;

(6) involve parents in cooperative efforts and programs;

(7) use a wide range of strategies to comprehend, interpret, evaluate, and appreciate literary and other texts; and

(8) demonstrate an understanding of the uses of reading for different purposes.

c. demonstrate knowledge and an understanding of different composing processes, including being able to:

(1) use a wide range of writing strategies to generate meaning and to clarify understanding;

(2) produce different forms of written discourse for various audiences demonstrating conventional usages for those forms and audiences;

(3) demonstrate how written discourse can influence thought and action; and

(4) revise, edit, and proofread written text.

d. demonstrate knowledge and an understanding of an extensive range of literature, including being able to:

(1) demonstrate knowledge of a broad historical and contemporary spectrum of United States and world literatures, including

(a) literature from a range of cultures;

(b) literature from a range of genres;

(c) literature by authors of both genders;

(d) literature by authors of color; and

(2) demonstrate an extensive knowledge of award winning books especially written for early adolescents, including themes, character, settings, and level of reading difficulty.

e. demonstrate knowledge and an understanding of the range and influence of print and nonprint media and technology in contemporary culture, including being able to demonstrate an understanding of and the ability to use current technologies in communication;

f. demonstrate methods for conducting inquiry research; and

g. demonstrate an understanding of and be able to apply the principles of contemporary rhetoric, interpersonal communication, and public address.

9. **Mathematics**. The program should prepare prospective teachers to:

a. demonstrate an understanding of and model, in a variety of ways, basic concepts of number and operations, including being able to:

(1) demonstrate an understanding of the conceptual basis for the real number system, including properties that unite and separate various number systems;

(2) describe the additive and multiplicative nature of numbers, and facilitate students in transitioning from additive to multiplicative models;

(3) recognize the pervasiveness of proportionality across mathematical strands, and apply the concept as a model in describing a variety of situations, including those calling for ratios and percent;

(4) demonstrate an understanding of the various ways of making estimates, and appropriate and inappropriate uses of estimates; and

(5) utilize technology, hands-on activities, and manipulatives to support and facilitate appropriate development of numerical skills, and solve a variety of problems using mental processes, pencil and paper, and calculators.

b. recognize algebra as a language for modeling problem situations and representing numerical patterns and quantitative relationships in symbolic and graphical forms, including being able to:

(1) describe the importance of early work with basic patterns and the later conceptual development of important ideas related to functions;

(2) demonstrate an understanding of the algebraic techniques and procedures for transforming and simplifying algebraic representations, as well as how to reason about relations and how to draw inferences in solving problems;

(3) demonstrate an understanding of the different kinds of functional relations - including polynomial, exponential, rational and trigonometric functions - and create examples of each.

c. demonstrate an understanding that geometry provides a repertoire of techniques for describing, representing, and reasoning about the shape, size, measure, and position of objects and visual patterns, including being able to:

(1) describe the characteristics of different shapes and how shapes can be related;

(2) use geometric concepts to record and analyze properties of shapes and patterns and to study the ways those objects and patterns change when acted upon by transformations;

(3) use geometric relations in Euclidean and other geometric spaces to solve problems in fields from architecture and engineering to space science and the design of communication networks;

(4) demonstrate an understanding of the structure and use of systems of measurement, including being able to solve a variety of problems involving geometry and measurement; and

(5) use algebraic methods to help in reasoning about geometric situations, including use of visual models and methods to provide insight in thinking about patterns in quantitative and symbolic data.

d. demonstrate an understanding of and be able to apply the conceptual and procedural tools for collecting, organizing, and reasoning about data, including being able to:

(1) utilize a variety of formats for collecting and reporting data;

(2) demonstrate an understanding of the basic principles of inference;

(3) apply numerical and graphical techniques for representing and summarizing collections of data, to interpret and draw inferences from the data, and make decisions in a wide range of applied problem situations; and

(4) use statistical methods to make generalizations about samples based on the methods and language of probability.

e. demonstrate an understanding of and be able to apply the concepts of discrete mathematics, including being able to:

(1) apply algorithmic thinking to solve problems involving discrete data;

(2) represent problems using matrices, finite graphs, and tree diagrams;

(3) use counting techniques to enumerate possibilities involving order and combinations; and

(4) describe basic algorithms for doing everyday tasks and use technology to solve a variety of discrete mathematics problems in practical settings.

f. demonstrate an understanding of and be able to apply mathematical thinking processes, including being able to:

(1) use strategies and concepts for discovering and describing patterns in visual, numerical, and symbolic data (i.e., processes such as classification, representation, and inductive reasoning and concepts such as symmetry, similarity, randomness, stability, recursion, and continuity);

(2) use methods of formal verification for mathematical conjectures, including rules of logical inference and proof strategies;

(3) model mathematical relations in problem situations by using symbolic expressions - representing important relationships, operating on symbolic expressions to gain understanding of the situation or to draw inferences about it, and apply results of mathematical analysis to solve problems and make decisions;

(4) use heuristics of solving mathematical problems (e.g., testing extreme cases, using guess-and-check methods, conducting an organized search of specific examples, or using visual problem representations);

(5) use calculating and computing technologies to search for patterns in numeric, graphic, and symbolic data; and

(6) use strategies for communication of mathematical information in verbal, numerical, graphical, and symbolic forms and through physical models of mathematical principles.

10. **Natural Sciences**. The program should prepare prospective teachers to:

a. demonstrate knowledge and an understanding of the unifying concepts and processes of science, including being able to:

(1) analyze systems, order, and organization;

(2) interpret and explain evidence and models;

(3) evaluate change, constancy, and measurement, including being able to:

(a) select and use appropriate measurement units (both English and metric);

(b) quantify changes in systems; and

(c) investigate and describe changes in terms of scale, rate, and pattern;

(4) analyze the relationship between form and function; and

(5) change over a period of time.

b. demonstrate knowledge and an understanding of science as inquiry, including being able to:

(1) design and conduct scientific investigations;

(2) evaluate methodological procedures; and

(3) interpret and communicate investigation results in a scientific manner.

c. demonstrate knowledge and an understanding of physical science, including:

(1) properties of matter;

(2) physical and chemical changes in the properties of matter;

(3) motion and force; and

(4) transfer of energy, including heat, light, chemical, sound, and electrical.

d. demonstrate knowledge and an understanding of life science, including:

(1) structure and function in living systems;

(2) reproduction and heredity, including sexual and asexual reproduction, and the effect of genes on heredity and organism characteristics;

(3) regulation and behavior, including;

(a) how organisms obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment;

(b) how behavior is a response to internal and external stimuli; and

(c) how an organism’s behavior evolves through environmental adaptation.

(4) populations and ecosystems; and

(5) diversity and adaptations of organisms.

e. demonstrate knowledge and an understanding of earth and space science, including:

(1) structure of the earth, and forces creating change in the earth's surface and atmosphere;

(2) earth's history; and

(3) the earth in the solar system, including:

(a) the relationships between the solar system, galaxies, and universe;

(b) the relationships between the motion of the earth and each of the following: day, year, seasons, eclipses, and phases of the moon;

(c) gravity's relationship to the solar system; and

(d) the relationship of the sun's energy and the atmosphere, and the sun's energy and the earth's surface.

f. demonstrate knowledge and an understanding of the relationships between science and technology, including:

(1) technological design;

(2) the difference of scientific inquiry from technological design;

(3) the reciprocal nature of science and technology; and

(4) the limits, and the intended and unintended consequences of technology.

g. demonstrate knowledge and an understanding of science in personal and social perspectives, including:

(1) the relationships of personal health with natural phenomenon and personal decisions regarding exercise, nutrition, and use of drugs;

(2) the relationships between populations, resources, and environments;

(3) the effects of natural hazards on the environment, e.g., earthquakes, and investigations which reveal how human activities can mitigate or accelerate the effects;

(4) how perceptions of risks and benefits influence personal and social decisions; and

(5) the components affecting science and technology in society, including:

(a) ethical codes followed by scientists;

(b) societal influence on research; and

(c) limits of scientific research.

h. demonstrate knowledge and an understanding of the history and nature of science, including:

(1) the scientific process;

(2) the history and contributions of several early and modern scientists, engineers, and/or professionals in related fields, including:

(a) those from various social and ethnic backgrounds; and

(b) at least one innovator who had to overcome flawed, commonly held beliefs of his/her time to reach conclusions that are now taken for granted.

11. **Social Sciences**. The program should prepare prospective teachers to demonstrate knowledge and an understanding of and be able to teach:

a. western and eastern civilizations from 1000 A.D. to the present;

b. physical and cultural geographic concepts, skills, and processes;

c. United States history from the colonial period to the present;

d. United States and Nebraska governments; and

e. United States and Nebraska economies.